

What is claimed is:

1. A synchronous rectification circuit with dead time regulation connected to a secondary side of a transformer, an inductor, a first switch and a second switch for producing DC power, said circuit comprising:

5 a first switch control circuit connected to one terminal on the secondary side of said transformer and to said first switch, said first switch control circuit receiving an input voltage from the secondary side of said transformer to control ON/OFF of said first switch;

10 a dead time regulation circuit connected to said DC power and to said first switch control circuit, said dead time regulation circuit producing a dead time regulation signal; and

15 a second switch control circuit connected to one terminal on the secondary side of said transformer, to said second switch and to said dead time regulation circuit, said second switch control circuit receiving an input voltage from the secondary side of said transformer and said dead time regulation signal to control ON/OFF of said second switch.

2. The synchronous rectification circuit with dead time regulation of

20 claim 1, wherein said first switch control circuit comprises:

a waveform shaping circuit connected to one terminal on the secondary side of said transformer, said waveform shaping circuit shaping said input voltage to output a first driving voltage; and

a first driver circuit connected to said waveform shaping circuit and to

5 said first switch, said first driver circuit receiving said first driving voltage and producing a first control signal to control ON/OFF of said first switch.

10 3. The synchronous rectification circuit with dead time regulation of claim 1, wherein said dead time regulation circuit comprises:

15 a pulse generator circuit connected to said first switch control circuit, said pulse generator circuit producing a pulse signal based on said first control signal output from said first switch control circuit;

20 a voltage regulation circuit connected to said DC power, said voltage regulation circuit producing charging power;

25 a charging circuit connected to said pulse generator circuit and to said voltage regulation circuit, said charging circuit performing a charge/discharge operation based on said charging power and said pulse signal to produce a dead time regulation comparison signal;

30 and

35 a first comparator circuit connected to a first reference voltage level, to said charging circuit, to said pulse generator circuit and to said second switch control circuit, said first comparator circuit comparing said first reference voltage level with said dead time regulation comparison signal to produce said dead time regulation signal.

40 4. The synchronous rectification circuit with dead time regulation of

claim 3, wherein said dead time regulation comparison signal is a sawtooth wave signal.

5. The synchronous rectification circuit with dead time regulation of
5 claim 3, wherein said charging circuit is an RC charging circuit.

6. The synchronous rectification circuit with dead time regulation of
claim 1, wherein said second switch control circuit comprises:

10 an inverter circuit connected to one terminal on the secondary side of said
transformer, said inverter circuit inverting said input voltage to
output an inverted voltage;

15 a logic circuit connected to said inverter circuit and to said dead time
regulation circuit, said logic circuit performing a logic AND
operation on said inverted voltage and said dead time regulation
signal to produce a second driving voltage; and

a second driver circuit connected to said logic circuit and to said second
switch, said second driver circuit receiving said second driving
voltage and producing a second control signal to control ON/OFF of
said second switch.

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7. The synchronous rectification circuit with dead time regulation of
claim 1, further comprising a low voltage protection circuit connected to said
DC power, to said first switch control circuit and to said second switch control
circuit, said low voltage protection circuit receiving said input voltage and

controlling operation of said first switch control circuit and said second switch control circuit.

8. The synchronous rectification circuit with dead time regulation of
5 claim 7, wherein said low voltage protection circuit comprises:

a second comparator circuit connected to said DC power, said second comparator circuit comparing said DC power with a second reference voltage level to produce a protection control signal;

10 an electronic switch circuit connected to said second comparator circuit, to said first switch control circuit and to said second switch control circuit, said electronic switch circuit receiving said protection control signal and being controlled to ground output voltages of said first switch control circuit and said second switch control circuit.

15 9. The synchronous rectification circuit with dead time regulation of
claim 8, wherein said electronic switch circuit comprises a transistor connected with at least one diode.

10. The synchronous rectification circuit with dead time regulation of
20 claim 1, wherein said first switch control circuit, said second switch control circuit, said dead time regulation circuit and said low voltage protection circuit of claim 6 are packaged as a control IC having at least a power pin, a ground pin, a first input pin, a second input pin, a first output pin, a second output pin, a reference voltage pin and a reference capacitor pin.